



2018 CANADIAN CONSULTING
ENGINEERING AWARDS

Detailed Inspection of the Coast Meridian Overpass

Category B: Transportation



Detailed Inspection of the Coast Meridian Overpass

The success of a community is dependent on its transportation network.

Stantec Consulting Ltd. (Stantec) partnered with the City of Port Coquitlam to develop an inspection and maintenance plan for the Coast Meridian Overpass, a six span, 580 m cable-stayed bridge through a major arterial corridor over the Canadian Pacific Railyard in Port Coquitlam. Since its construction in 2010, the Coast Meridian Overpass is considered the largest ever transportation project completed by the City.

Project Highlights

Q.1 INNOVATION

The scope of work was completed by a team of specialized in-house Stantec bridge engineering inspectors, qualified in professional rope access. For this type of bridge, each structural element inspected needed to be evaluated for material deterioration, weathering and aging effects, load-induced distress, indications of overloading, excessive deflection, and adequate bearing. A Detailed Condition Inspection per Ministry of Transportation and Infrastructure (MoTI) standards also requires that inspectors be able to access within arm's length and provide condition ratings for all required structural components. By implementing an aerial rope access inspection, Stantec's climbing inspectors travelled the entire length of the 26 cable stays and gained access to the associated cable anchorages, pylon splice connections and the interior and exterior faces of pylons. These innovative rope access techniques saved valuable time and money on traffic control setups, railway work permits, and unnecessary mechanical equipment.

A snooper truck was mobilized to inspect the deck soffit and the exterior of the steel plate box girders supporting the deck. Confined space entry procedures were also used to inspect the entire length of the inside of steel plate box girders and bridge pylons. All bridge inspectors, access methods, and equipment were in compliance with the Society of Professional Rope Access Technicians (SPRAT) and WorkSafeBC requirements.

The detailed inspection of the cables included induced vibration measurements (harmonic frequency testing) to determine the in situ forces in each cable to compare against the as-built condition. Non-destructive testing consisting of ultrasonic testing was also completed on the steel pylons and steel box girders to develop a baseline measurement for inspections in the future.

Performance deficiencies were identified and recorded, while maintenance recommendations for the structure and its elements were developed including recommended timing for the work to be

completed. The urgency and relevancy of work has been assigned to prioritize remedial work in the short/ medium/ long term.

Overall, our professional inspection team provided efficiency in the condition assessment process by putting qualified bridge experts within an "arm's length" of the fracture critical structural elements of the overpass. There is no substitute for having certified engineers actually putting our hands on the critical elements and recording condition data that will be used by the City to implement future repairs.





Q.2 COMPLEXITY

Bridge inspections tend to take time, cost money, and can be an inconvenience to the public when travel lanes must be shut down to accommodate various equipment on the bridge. Many Owners utilize drones for inspection work, but this approach is not as effective as having an inspector up close and personal to the main structural components of the bridge.

Stantec was brought in as partners, where our engineers referred the City to the Provincial standards of bridge inspection and maintenance. Stantec helped the City build a technical justification and business case to perform a climbing inspection using a combination of Stantec's in-house bridge inspection team and rope access team. The same Professional Engineers that would be performing the inspection within an arm's length of the bridge components would be the same Engineers that

would prepare the final inspection report for the Owner. The use of bridge climbers not only allowed Stantec to reduce project costs and overall inspection time, but also reduced public inconvenience by requiring less travel lanes to be closed for shorter periods of time in comparison to using more conventional inspection methods.

The detailed inspection was completed to verify the condition of each component, update the City of the current standard of the bridge and identify defects that could impact public safety, structure performance, or serviceability. The project team developed a 10-year maintenance program to optimize an asset management strategy of the bridge, assisting the City in planning future maintenance and rehabilitation works.

Q.3 SOCIAL AND/OR ECONOMIC BENEFITS

Keeping the Community Safe

The inspectors created the first ever detailed inspection record of the Coast Meridian Overpass, including a photographic record of the entire bridge structure noting any deficiencies in their survey. With this valuable baseline data, Stantec were able to forecast future problems and develop a maintenance plan, allowing the municipality to accurately budget for future structural repairs and maintenance.

Limiting Traffic Disruption

Consisting of five towers with 16 cables per tower, Stantec were able to inspect the bridge in four working days. The inspection would have taken twice as long using just a lift. This resulted in closing lanes of traffic on the bridge for a significantly shorter period of time.

Protecting Public Investment

It was the City's overall goal for this project to protect the public investment associated with this landmark structure and to address the public concerns of pylon corrosion.

Reducing Economic Impact

The Coast Meridian Overpass crosses over the Canadian Pacific Railyard. The use of roped access allowed the rail lines below to operate without interruption and created a significant cost savings to the City over the use of mechanical equipment.





Q.4 ENVIRONMENTAL BENEFITS

Creating Sustainable Solutions

Innovative and safety features were incorporated in the inspection. Climbers used industrial rope access techniques to inspect the steel pylons and cables to complete a hands-on inspection of every component, helping to improve project efficiency, reduce the cost to the City, and maximize funding of the tax paying public. With less traffic disruption, and shorter overall inspection duration, the carbon footprint of the detailed condition inspection was minimized.

The quality of life of residents was improved and leadership was demonstrated by the City through maintaining safety of the structure and reducing traffic impacts on the surrounding community.

The safety of our inspection team was maintained through the use of specialized rope access

equipment. SPRAT methods were employed using double redundant rope systems consisting of a main rope and safety back-up rope anchored to the structure at locations that allowed inspectors to safely descend or ascend and access each portion of the structure at arm's length. Careful maintenance of ropes and hand-held inspection equipment allowed our inspectors to complete the inspection without the use of mechanical equipment, traffic control, or traffic disruptions.

Finally, a long term, multi-year maintenance planning strategy was developed as a result of the inspection findings to assist the City with optimization of their infrastructure preservation.

Q.5 MEETING CLIENT'S NEEDS

Similar to a new car needing oil changes, a new bridge requires regular inspection and maintenance. The current MoTI standard is to have an annual routine level inspection, and a detailed inspection to be performed every five years. With the warranty expired, it was up to the City of Port Coquitlam to maintain their most prized asset. Stantec were retained to develop a 10-year maintenance program to optimize an asset management strategy of the bridge, assisting the City in planning future maintenance and rehabilitation works.

The perception is often that when a bridge is built, it should last a lifetime, so tax payer's money often gets prioritized differently with bridge infrastructure being largely invisible to the general public. However, regular bridge inspections and maintenance are

required to maintain the asset and to provide the city with a comprehensive, long-term and cost-effective solution for structure preservation.

A key challenge involved the maintenance of relationship between client and stakeholders. With complicated access and transition zones along an active transit corridor, and a 42-track railyard below, Stantec engaged all key stakeholders for the development of a Site Specific Work Plan. With careful planning and open lines of communication with the client, railyard and Emergency Services, the inspection team were able to complete the bridge inspection on schedule, without disrupting the public, emergency services or the active rail yard below, helping to maintain the vital relationships that form the heartbeat of this community.









